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Artificial Raising of Lignicolous Lepidoptera[1]

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Abstract. Two alimentary media are described—one synthetic the other semisynthetic—on which eight species of lignicolous Lepidoptera have been raised to the imago stage.

Introduction

Bottger (1940) pioneered the development of artificial diets for raising Lepidoptera. He studied the chemical composition of the green plants associated with the survival, growth and metamorphosis of *Pyrausta nubilalis* Hubner (European corn borer) and in 1942 managed to produce an alimentary medium composed of casein, fats, salts, vitamins, agar and water.

Since then artificial diets have been successfully used with over 250 species of these insects, generally from the following families: Hepialidae, Aegeriidae, Gelechiidae, Oecophoridae, Yponomeutidae, Plutellidae, Tinaeidae, Lyonetiidae, Cossidae, Eucosmidae, Tortricidae, Galleriidae, Crambidae, Phycitidae, Pyralidae, Lasiocampidae, Attacidae, Bombycidae, Papilionidae, Pieridae, Nymphalidae, Hesperiidae, Geometridae, Sphingidae, Notodontidae, Lymantriidae, Noctuidae and Arctiidae (Notario, 1978a).

Material and Methods

Since 1973 research has been carried out in the Department of Zoology and Entomology (Escuela Técnica Superior de Ingenieros de Montes) into artificial raising techniques, the main objective being to obtain adult lignicolous Coleoptera. However, attempts have also been made to extend our field of study to those species of other orders whose feeding habits are similar. It should be kept in mind that one of the diets we based our initial work on (Gardiner, 1970) was a modification of that used by MacMorran (1965) to raise *Choristoneura fumiferana* Clemens a spruce and fir boring Lepidopteran.

This enabled us to raise *Aegeria apiformis* Clerck and *Paranthrene tabaniformis* Rottemburg, both lignicolous aegeriids attacking poplars (Notario, 1978b).

Encouraged by these results and thanks to grants made on the one hand by the Scientific and Technical Assessment Commission and on the other by an agreement between the Insect Pests and Phytopathological Inspection Service and the School of Forestry, we continued our work a number of different media being produced.

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Two of these media were eventually found to satisfy the food requirements of the insects treated. The first is composed as follows:

Distilled water	25 cc
Agar	3,5 g
Cellulose	2 g
Glucose	1,5 g
Brewer's yeast	3 g
Vitamin free casein	1,2 g
Saccharose	2,5 g
Ascorbic Acid	0,4 g
Benzoic acid	0,1 g
Salt mixture	1 g
Vitamin solution	2 cc
Nipagin solution	

The Nipagin solution consists of 1 g of methyl-p-hydroxybrenzoate in 5 cc of 70° alcohol. Both the salt mixture and the vitamin solution have been described elsewhere (Notario and Baragaño, 1978).

The composition of the second medium, semisynthetic this time, is as follows:

Distilled water	200 cc
Agar	10 g
Specific component	44 g
Brewer's yeast	11 g
Nipagin solution	
Benzoic acid	1 g
Maize semola	22 g
Wheat germ	44 g
Ascorbic acid	0,6 g

"Specific component" is the denomination given to the immature insect's food in nature. This material is dried, blended and sterilized, at which point it is ready for mixing in the diet.

For both the synthetic and the semisynthetic media, the agar-water solution is heated on a hot plate until a gel is formed. Then the nipagin solution and benzoic acid are added and carefully mixed. The remaining components are now added with the exception of the ascorbic acid and vitamin solution in the first medium and the ascorbic acid in the second. The resulting mixture is allowed to cool to 60°C when the final components are added. It is now ready for distribution in the breeding chambers or for storage in hermetically sealed jars at 2-3°C.

Breeding chambers and the cages where they are housed have been described by Viedma *et al.* (in press).

Results

Eight species of Lepidoptera have been successfully raised from various larval stages to adulthood. They were as follows:

Family AEGERIIDAE
Synanthedon vespiformis Linnaeus
Family COSSIDAE
Cossus cossus Linnaeus
Family TORTRICIDAE
Rhyacionia buoliana Schiffermueller

Family PHYCITIDAE
Dioryctria mendacella Staudinger
Dioryctria silvestrella Ratzeburg
Dioryctria pineae Staudinger
Family PYRALIDAE
Myelois cribrella Hubner
Family ARCTIIDAE
Tyria jacobaeae Linnaeus

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